

REMARKS

This is in response to the Office Action of November 14, 2002. In view of the foregoing amendments and following representations, reconsideration is respectfully requested.

In the previous Office Action, the drawings are objected to because the Examiner contends that several features recited in claims 15, 18 and 22 are not shown. The Examiner's objection does not provide any comments in response to the arguments set forth on page 9 of the amendment filed on October 18, 2002. Accordingly, Applicants have no indication of whether the comments were considered, or if they were considered, why they were not persuasive. Accordingly, the relevant comments from the previous amendment are repeated below.

With regard to claim 15

(1) The Examiner contends that each of the component supply tables are not shown. However, it is submitted that the features recited in lines 5-10 are adequately illustrated in the drawings as will be demonstrated below. Lines 5-10 of claim 15 recite that:

"each of said component supply tables being supported on casters so as to be movable between support frames toward and away from the respective side of the board mounting position and replaceable by being removed from the respective side of the board mounting position so that a new component supply table for accommodating a plurality of components can be positioned at the side of the board mounting position vacated by one of the component supply tables".

In other words, the above quoted language of claim 15 requires that each of the component supply tables is supported on casters and is capable of being moved toward and away from the mounting position. The drawings show a plurality of component supply tables 28A, 28B supported on casters 40 which is the structure recited in lines 5-10. If the Examiner disagrees, then he is requested to specifically indicate what further structure is required to be shown in the drawings.

(2) After numerous Office Actions, the Examiner now indicates that the movement directions of the first and second mounting heads are not adequately illustrated. In this regard, the Examiner's attention is directed to Fig. 3, which shows two mounting heads and the respective movement directions indicated by arrows. If this illustration is deemed insufficient, then the Examiner is requested to specifically explain why the directional arrows are inadequate.

Regarding claim 22

This objection is similar to objections made earlier in the prosecution of the present application. However, most of the language quoted by the Examiner is not found in the claims. Furthermore, the different types of boards are not positive recitations in claim 22, therefore, do not need to be illustrated. Should the Examiner disagree, then the Examiner is requested to cite authority for the position that language, which is not a claimed feature, must be illustrated in the drawing figures.

Regarding claim 18

The language referred to by the Examiner recites a "capability" of the claimed mounting heads. This language simply states that each mounting head is capable of moving between the board and the respective component supply table independently of the other mounting head. What further structure needs to be illustrated?

Further, the Examiner objects to the drawings in item 3 of the Office Action because lines 1-4 are allegedly not shown. Each structural feature is shown in the drawings, however all possible positions of the mounting heads are not illustrated, nor need they be for a proper understanding of the invention. Is the Examiner contending that the mounting heads, as disclosed, are not capable of assuming the described position? Why would one of ordinary skill in the art need such an illustration to obtain a proper understanding of the invention? Note that the Examiner's objection suggests that a structural detail, which is essential for a proper understanding of the invention, is not shown. It is submitted that all such structural details are adequately illustrated. Should the Examiner maintain this objection, then the Examiner is requested to specifically identify the essential structural details that are not shown in the drawings.

In view of the above, it is submitted that all claimed features are adequately illustrated in the drawings, and thus the Examiner is requested to withdraw the objections to the drawings.

* * * *

Next, in item 5 of the Office Action, claims 15-17, 19-20 and 22 are rejected under 35 U.S.C. 112, first paragraph. The rejection makes no reference to the comments presented in the amendment filed on October 18, 2002.

The Examiner contends that the specification, as originally filed, does not support the language of claim 15, lines 5-10 and claim 22, lines 1-5.

It is submitted that the specification provides adequate support for lines 5-10 of claim 15 as will be demonstrated below.

Page 15, lines 18-21 of the specification, as originally filed, states that:

"Between both the support frames 29 are inserted the component supply tables 28A from both depthwise sides as moved by casters 40, and thereafter they are fixedly installed in specified positions."

The quoted language clearly describes that each supply table is movable into a position between the support frames. The movement of each supply table is possible because the supply tables are each mounted on casters 40, which permits each supply table to be moved into a specified position between support frames 29, and then fixedly installed in the specified position.

Furthermore, page 23, lines 8-14 of the specification, as originally filed, describes that:

"When the types of circuit boards 37 increase, it can be coped with only by replacing a part of the component supply tables 28A through 28D installed at the component mounting apparatuses 27A though 27D with component supply tables 28A through 28D mounted with required components 34. It is to be noted that the component mounting apparatuses 27A through 27D can be also used singly."

The above language specifies that one or more of the supply tables 28A-28D can be replaced with tables having the required components, and thus different board types (e.g. a first type and a second type) can be worked on in the claimed apparatus. Note that page 24, line 25 to page 25, line 4 of the specification, as originally filed, also describes that:

"With this arrangement, when the types of boards increase, it can be coped with only by replacing a part of the component supply tables of the component mounting apparatuses with component supply tables mounted with the required components."

In view of the above, it is submitted that the claim language is clearly supported by the specification as originally filed, in accordance with the provisions of 35 U.S.C. 112, first paragraph.

* * * *

Next, in item 7 of the Office Action, claim 15-25 are rejected under 35 U.S.C. 112, second paragraph.

Regarding line 6 of claim 15, as is common in claim drafting, the term "respectively" is used to establish a one-to-one relationship between the tables and the sides of the board mounting position. It follows that each table is positioned at a "respective side" of the board mounting position. The language identified by the Examiner is not accurately quoted by the Examiner, which may account for the confusion. Clearly, as defined in lines 1-4 of claim 15, each table is located at its respective side of the board mounting position.

Regarding line 9 of claim 15, the claim has been amended to avoid any possible confusion regarding the recitation of "the side" of the board mounting position.

Regarding the last two lines of claim 15, the language "independently movable" means that the movement of one of the heads is not dependent on movement of the other of the heads. The movement of each head is between the "respective" component supply table and the board mounting position. The claims never recite that the first mounting head moves to the second mounting table.

Regarding claim 22, the Examiner questions how it is possible to perform mounting operations on two different types of boards if the apparatus can only accommodate one type of board at a given moment. Accordingly, claim 22 has been amended to avoid any possible confusion.

In view of the above, it is submitted that each of the pending claims now clearly complies with the provisions of 35 U.S.C. 112, second paragraph. However, in the event that the Examiner continues to be confused and/or uncertain of what is required by the claim language, then the Examiner is respectfully requested to contact Applicants' undersigned representative so that a telephone or personal interview can be arranged in order to advance the prosecution of the present application.

* * * * *

Next, in items 9-10 of the Office Action, the claims are rejected as follows:

Claims 15-17 and 19-20 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Baker (USPN 5,323,528) in view of Kitamura et al. (USPN 5,740,604);

Claims 18 and 21-25 are rejected as under 35 U.S.C. § 103(a) as being unpatentable over Baker in view of Kitamura and further in view of Nakao et al. (USPN 5,743,005).

It is submitted that the present invention, as embodied by claims 15-25, clearly patentably distinguishes over the applied prior art references for the following reasons.

Baker discloses, as shown in Figs. 3 and 5, component feed tables arranged on both of sides of head movement center line (X-axis) 63. The heads are located on opposite sides of Y-axis 53. The two pairs of component feed tables are positioned on opposite sides of the Y-axis 53 and are each spaced a certain distance from the Y-axis 53. The movement direction of the head for taking out components from the component feed tables is not the same as the direction of the head for supplying the taken-out components to the board, resulting in the necessity of a certain head movement distance from the taking-out position to the mounting position. Thus, it is necessary to provide additional space and additional operating time.

In contrast, in the present invention, as defined in claims 15, 18 and 23, the mounting head sections are movable in first and second directions which are perpendicular to each other. The Baker mounting head are movable in only one direction, i.e. along the X-axis. Further, in the present invention, the component supply tables are arranged on opposite sides of a board mounting position, and adjacent to the board mounting position (claim 15) as shown in Fig. 1. Thus, the direction of the head for taking out components from the component supply tables is the same as the direction of the head for supplying the taken-out components to the board, thereby resulting in a reduction in the head movement distance from the taking-out position to the mounting position as compared with

the Baker system. Accordingly, in the present invention, it is unnecessary to provide additional space unlike Baker.

Further, in Baker, since the table on which a board is placed is moved in the Y-direction, if the board is moved at a high speed after a large component is mounted thereon, the large component might be shifted on the board. In order to prevent such a shift, the table must be moved at lower speed in order to increase the operating time.

In contrast, in the present invention, as defined in claims 15, 18 and 23, each of the heads is moved in both the X and Y directions while the board is fixed at the mounting position, and thus the board is not moved in the of the X and Y directions during a mounting operation. Thus, even when a large component is mounted on the board, the board will not be moved at a high speed, thereby avoiding any shift of the large component and reducing operating time relative to the Baker system.

Kitamura discloses a component mounting apparatus having a replaceable component supply. In Kitamura, when a component supply table is taken out from a wagon 30 to transfer the table to the component-mounting apparatus, it is necessary to adjust the height and position of the table relative to the component-mounting apparatus, and at that time, the operation of the component-mounting apparatus must be stopped.

In contrast, in the present invention, each of the component supply tables is supported on casters so as to be movable between the support frames towards and away from the respective side of the board mounting position. Accordingly, each of the tables can be replaced by being removed from the respective sides of the board mounting

position so that a new component supply table for accommodating a second plurality of components can be positioned at the side of the board mounting position vacated by one of the component supply tables. That is, without any transfer between a wagon and the apparatus and any adjustment of the height and position of the wagon, the component supply table can be directly positioned at the vacated side of the board mounting position due to the casters. Thus, the time in which the mounting operation is stopped can be greatly reduced in comparison with the Kitamura apparatus.

Nakao discloses a mounting apparatus in which components, taken out from a component supply section located on an upstream side, are sequentially mounted onto a board transferred at a certain speed. Thus, the component supply sections can not be easily replaced with other component supply sections in accordance with the kinds of boards for component-mounted board production. Clearly, Nakao does not teach the claimed features that are omitted in the Baker and Kitamura references.

In view of the above, it is submitted that the present application is now clearly in condition for allowance. The Examiner therefore is requested to pass this case to issue.

In the event that the Examiner has any comments or suggestions of a nature necessary to place this case in condition for allowance, then the Examiner is requested to contact Applicant's undersigned attorney by telephone to promptly resolve any remaining matters.

Respectfully submitted,

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15. (Five Times Amended) A component mounting apparatus comprising:
a pair of component supply tables for accommodating a first plurality of components, said component supply tables being arranged adjacent to and on opposite sides of a board mounting position, respectively,

each of said component supply tables being supported on casters so as to be movable between support frames toward and away from the respective side of the board mounting position and replaceable by being removed from the respective side of the board mounting position so that a new component supply table for accommodating a second plurality of components can be positioned in place of the removed component supply table [at the side of the board mounting position vacated by one of the component supply tables]; and

a first mounting head section for successively picking up components at one of the component supply tables, thereafter moving to a board positioned at the board mounting position, and thereafter successively mounting the picked-up components onto the board while moving in first and second directions which are perpendicular to each other,

wherein the first direction is perpendicular to a board transfer direction in which the board is transferred, and the second direction is located along the board transfer direction,

a second mounting head section for successively picking up components at the other of the component supply tables, thereafter moving to the board positioned at the board mounting position, and thereafter successively mounting the picked-up components onto the board while moving in third and fourth directions which are perpendicular to each other,

wherein the third direction is parallel to the first direction, and the fourth direction is parallel to the second direction but is not necessarily the same direction as the second direction,

wherein each of the first and second mounting head sections is independently movable between one of the component supply tables and the board.

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22. (Amended) The component mounting apparatus according to claim 18, wherein the first component supply table is provided with components that are to be mounted on a first type of board, and the second component supply table is provided with components that are to be mounted on a second type of board so that [concurrent] mounting operations can be conducted on the first and second types of boards.

23. (Amended) A component mounting apparatus comprising:

a base structure;

a pair of inverted U-shaped support frames positioned on said base structure in a parallel relationship and on opposite sides of a board mounting position, wherein a board transfer path extends through openings in said U-shaped support frames;

a first component supply table supported on a plurality of casters, said first component supply table being removably secured between said support frames on a first side of the board transfer path,

a second component supply table supported on a plurality of casters , said second component supply table being removably secured between said support frames on a second side of the board transfer path, wherein each of said first and second component supply tables accommodates a plurality of components,

wherein each of said component supply tables can be moved in a perpendicular direction toward and away from the board transfer path;

a first mounting head section for successively picking up a plurality of components at said first component supply table, thereafter moving to a board positioned at the board mounting position, and thereafter successively mounting the plurality of picked-up components onto the board; and

a second mounting head section for successively picking up a plurality of components at the second component supply table, thereafter moving to the board positioned at the board mounting position, and thereafter successively mounting the plurality of picked-up components onto the board,

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wherein each of the first and second mounting head sections is capable
of moving in first and second directions which are perpendicular to each other [are
capable of independently moving between the board and said first and second
component supply tables, respectively].